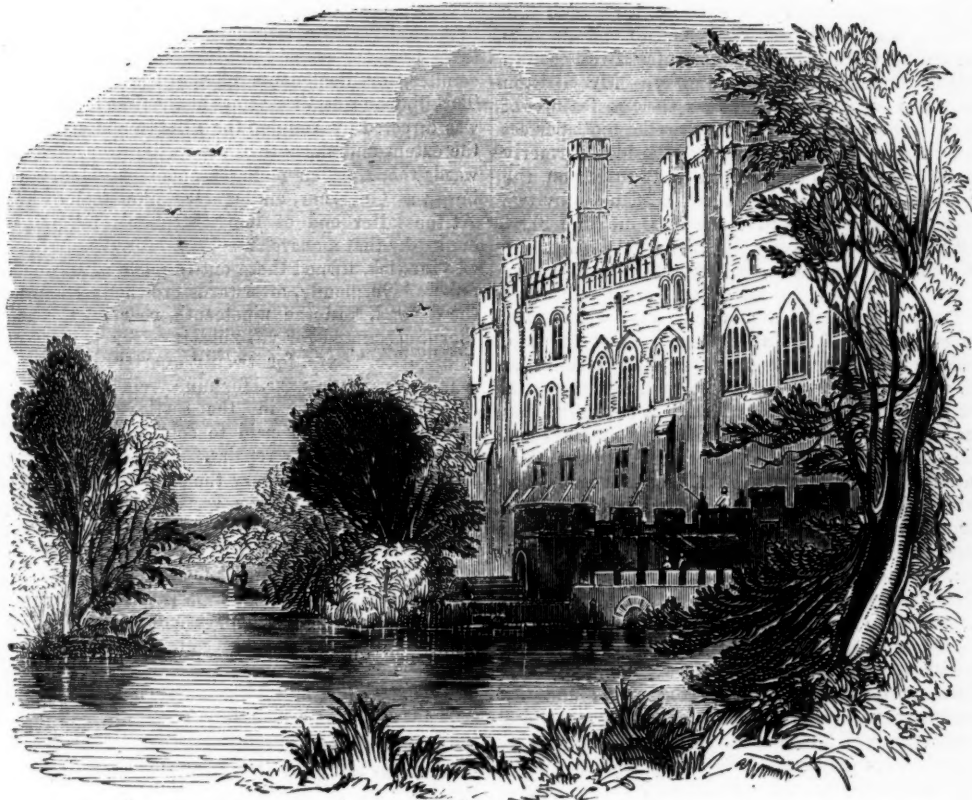




WARWICK CASTLE.



Now Warwick claims the song, supremely fair
In this fair realm; conspicuous raised to view,
On the firm rock, a beauteous eminence
For health and pleasure formed. Full to the south
A stately range of high embattled walls
And lofty towers, and precipices vast,
Its grandeur, worth, and ancient pomp confess.

AMONG the number of castellated mansions (remarks Mr. Britton), which formerly abounded in England, very few have continued to be inhabited, and adapted to the domestic arrangements of modern times. Those of Windsor, Raby, Lumley, and Warwick, are therefore remarkable: for whilst they present the external features of feudal ages, and impress the spectator with sentiments of chivalry and romance, their apartments are at once spacious and elegant; their inmates are accomplished and polite; and the annexed gardens and pleasure-grounds are replete with every charm to fascinate the eye and please the senses. Formerly these places were intended to protect a rude and austere race of mail-clad knights and their vassal dependants; now they are occupied by men of enlarged and enlightened minds, and by women of suavity, benevolence, and beauty. Instead of the art of war, and human butchery, as formerly studied within their walls, we now find the fine arts and literature cultivated and understood. The contrast is powerful and cheering: for now, instead of viewing the frowning battlements and dismal cells with dread and terror, we

contemplate them as objects of grandeur and picturesque beauty.

The present Castle of Warwick affords specimens of the workmanship of different and distant ages. The oldest parts present some bold and almost impregnable specimens of Norman architecture, whilst a few parts display the tasteless additions of modern times. The foundation is laid on a vast bed of rock, which rises precipitously from the northern bank of the river Avon. Impending over this classical stream is a long line of buildings, consisting of towers, state apartments, and subterranean offices. At the south-eastern extremity is that majestic edifice called Caesar's tower, and, at the opposite end, is a bold projecting turret. This front extends above 400 feet, and presents, in its elevation, a grand, picturesque, and stupendous mass. From the level of the water to the basement floor, the rock has been cut away in an almost perpendicular face, and is nearly of equal height with the whole superincumbent building. This mass of rock is diversified by hanging shrubs, fissures, and varied stains and mosses. Projecting from it, near the eastern end, is a flour mill, from which a ledge of rocks extends across the river, and occasions a constant water-fall, of nearly the whole stream. The southern front, with the return of the western side, consists of a gallery, a tower gateway to the inner court, and a flanking wall connecting this gateway with the keep-tower, which occupies the summit of a high conical

mount. The embattled and terraced wall again returns from this keep round the northern side of the inner court; and about midway between the eastern and western ends, it forms a semicircular sweep, and is flanked and guarded by two bastion towers. The walls and small apertures of these exhibit great strength. From these the wall continues to the north-east angle, where is a lofty polygonal building called *Guy's Tower*, and here the wall returns at right angles to the grand entrance tower gateway. Hence it passes to the great tower at the south-eastern angle. The whole of the walls are surmounted by embrasures, loop-holes for arrows, a parapet, and a terrace walk. The latter was conducted through the towers up and down flights of steps, and to various merlons and machicolations. Near the centre of the eastern wall is the principal entrance-gateway. Mr. Britton says that this is a grand and very curious feature of castellated architecture, and is perhaps the most perfect specimen remaining in the country. A bridge, formerly a draw-bridge, is thrown across a wide fosse; on the inner bank of which is the chief portal, flanked by two octagonal towers with small loop-holes in each face, holes over the arch, and a portcullis within. Further under the archway was a second barrier formed by strong folding doors or gates. About forty feet further was a second portcullis, and still within that was another pair of doors or gates, filling up a large arch. This passage, nearly ninety feet long, opens to the inner ballium or court by a lofty arch, flanked by octagonal towers, which rise to a considerable height, and contain several stories or floors, formerly used for the residence of porters and domestics. Other rooms, staircases, and galleries were distributed in various parts about this entrance. Near the doors and portcullises were apertures in the vaulted roof for annoying assailants, and under the arched way were several niches for wardens, and door-ways to stairs, to rooms, and to the walls. After passing through this long, gloomy, and strongly-guarded archway, we come to the inner ballium, surrounded by the principal dwelling apartments to the south; the lofty keep-tower and mount, with a tower gateway to the west; a high embattled wall with bastion towers to the north; and the Gateway tower, with *Guy's tower*, *Cæsar's tower*, and a lofty connecting wall to the east.

The two towers just named are very imposing objects and interesting examples of architectural design. The date of the elevation of *Cæsar's tower* is unknown: the mode of construction is somewhat rude, and possesses many singularities. "Jutting from one side of this tower is an embattled turret of stone, where imagination may place the herald at arms, demanding, in a long past century, the name and purpose of those so hardy as to advance unbidden." The other tower is named after the champion of the castle, the redoubted *Guy*. This part of the structure is upwards of 100 ft. in height, and was built by Thomas Beauchamp, earl of Warwick, in 1394, at the cost of 395*l.* 5*s.* 2*d.*

The entrance is flanked by embattled walls, richly clothed with ivy; and the deep moat, now dry, is lined with various shrubs, and ornamented with trees of a vigorous and noble growth. The disused moat is crossed by a stone bridge, and the entrance is by double machicolated towers, through a series of passages once fraught with multiplied dangers for the intruder. In the great court, to which the visitor passes, the display is truly magnificent. The area is a soft green sward; but, spread around, are viewed the remains of fortifications raised in turbulent ages. The relics are perfect in outline, and no battlement exhibits the havoc of time; while the hand of taste has spread a softness over the whole productive of most grateful relief. We see with pleasure the ivy bestow pictorial mellowness on parapets and turrets, which must have been only rugged and formid-

able when manned with warriors in steel, and fresh in early masonry; but now the broad Gothic windows supplant the cheerless single light and fatal loop-hole.

The interior of this august fabrie, (which is furnished in a chaste but magnificent style,) we need not describe. A few historical facts relating to the castle may, however, be found interesting.

There is no record concerning the precise era at which a fortified building was founded on this spot. The castle has been described by some writers as of British, and by others as of Roman, origin. The foundation seems to have taken place before the Norman Conquest; and it is probable that *Ethelfleda*, the daughter of King *Alfred*, first constructed a strong-hold in this place. The fortress was, for some time, the residence of the *Vicomites*, or lieutenants of the *Earls of Mercia*; and *Turkill*, who was *Vice-comes* at the time of the Conquest, was directed by *William the First* to add considerably to the extent and strength of the fortifications. Soon afterwards the Norman monarch appointed *Henry de Newburgh* as Governor, and created him *Earl of Warwick*. At the latter end of King *Stephen's* reign it was occupied by that monarch's soldiers, for *Gundred*, countess of *Warwick*, turned these out to make room for *Henry*, duke of *Normandy*, afterwards crowned as King *Henry the Second*. In the nineteenth year of this reign the sheriff accounted for *vi*l.* xiii*s.* iv*d.** for twenty quarters of bread-corn; *xx*s.** for twenty quarters of malt; *cs.* for four beefs salted; *xxx*s.** for ninety cheeses; and *xx*s.** for salt, then laid up in the castle. The next year *xxx*l.* xs. viii*d.** were paid to soldiers in garrison here; and *vi*l.* xiii*s.* x*d.** for repairs.

In the reign of *Henry the Third* the extraordinary strength of this building was alleged as a reason for prohibiting the widowed Countess of *Warwick* from marrying any person without the king's consent. In the furious contests which afflicted the latter years of *Henry the Third*, *Warwick Castle*, almost impregnable to open assault, was taken, in consequence of *William Mauduit*, the then earl, neglecting to keep due guard. The rebels were stationed at *Kenilworth* in great power. They surprised, and took possession of, *Warwick Castle*, took the earl and his countess prisoners, and demolished some of the walls. The damage thus done to the castle was not repaired till the reign of *Edward the Third*, when *Thomas Beauchamp*, earl of *Warwick*, "erected anew the outer wall of the castle, with divers towers." The castle was afterwards successively occupied and governed by *John de Clinton*, *Thomas Holland*, earl of *Kent*, *George Plantagenet*, duke of *Clarence*, and *Earl of Warwick*, who made some alterations in the buildings, and proposed to make more, but was attainted of high treason by his brother, King *Edward the Fourth*, who ordered him to be drowned in a butt of *Malmsey wine*.

The castle is described as being in a very ruinous condition in the second year of King *James the First*, when it was granted to *Sir Fulke Greville*, who expended "upwards of 20,000*l.* in repairing and adorning the same for a family-seat." "He made it," says *Dugdale*, "not only a place of great strength but extraordinary delight, and the most princely seat within the midland parts of England." He was created *Baron Brooke*, and, according to his monumental inscription, was "servant to Queen *Elizabeth*, counsellor to King *James*, and friend to *Sir Philip Sidney*." He was murdered by his own servant at *Brooke House*, in *Holborn*, and was succeeded by *Robert Lord Brooke*, who took part with the parliament against *Charles the First*. *Warwick Castle* now became a garrison. It was besieged in August, 1642, by the *Earl of Northampton*, and defended by *Sir Edward Peito*, with a very small force. Soon after was fought the celebrated battle of *Edge-hill*. *Lord Brooke* was killed by a musket-shot at *Lichfield*, and his son *Robert*, in more peaceable times, "fitted up the state apartment at a considerable expense," and made

* In one of the rooms attached to *Cæsar's Tower* are still preserved the sword, shield, helmet, &c. ascribed to the legendary hero *Guy*

many other improvements. The subsequent noble possessors of the castle have from time to time so arranged and decorated the halls, that, while a proper allusion is made to the antique castellated outlines of the edifice, the purely domestic comforts of the homes of England are not forgotten.

BEET-ROOT SUGAR.

IV. THE PRESENT MODE OF PREPARATION IN FRANCE.

CHAPTAL sows the beet seeds in the month of April or the beginning of May, and thus avoids on the one hand many inconveniences of cold and rain likely to result at an earlier period, and inconveniences of an opposite kind if left to the month of June. He recommends that every cultivator should prepare the seeds for himself, by using such as he had collected, in the previous September, from the beet plants, each of which will yield five or six ounces of seed. All arable lands are fitted for the growth of the beet; and Chaptal ploughs three times for the preparation of the beet-sowing, viz., twice during the winter, and once in the spring.

There are different modes of sowing the seeds. The first is, indiscriminately over the ground; a mode which takes much less time, at a season when all hands are busy; but in subsequently transplanting the young plants, they are very likely to be injured. Other methods are adopted by different persons; but the one which Chaptal prefers is, sowing in rows. When the ground is prepared, a range of depressions, about an inch in depth, are made by means of a rake whose teeth are eighteen inches apart; and women, who follow the rake, deposit seeds in the depressions, at a distance of about sixteen inches apart: each woman thus sows six or eight thousand seeds per day, and covers them over with earth by the hand.

As the beet is likely to be injured by the vicinage of other plants, and also by the earth being hard or not well drawn up around it, the young plants require careful attention. Weeding is necessary twice during the growth, not only for the removal of noxious plants, but also for the purpose of opening the ground to the reception of air and moisture. By the month of October the roots have acquired that perfection which fits them for further operations, and the plants are taken up before the frost arrives. In the southern and warmer parts of France, the root comes to maturity at an earlier period, and must be gathered early, else the saccharine principle undergoes changes which unfit it for the required purpose.

As each root is taken up, the leaves are cut off and left on the ground, where cattle and sheep feed on them; and it is found that the leaves which die and serve as manure to the soil bring it into a state peculiarly fitted for a corn crop. As the roots, when collected, are extremely sensitive to heat and cold, great care is required in their treatment. They are left on the field for a short time, to evaporate some of their moisture, and are then taken to a barn where they are laid in heaps, with layers of straw beneath, around, and above the heap. Some cultivators dig a trench in the open field, line it with straw, and fill it up with the beet-roots, which are then covered with thatch or straw. Shielded in this way from the weather, the roots remain until about to be used.

The first operation on the roots is to cleanse them from dirt and mould, and to cut off the rootlets and other useless parts. They are then ground to pulp by a machine, moved either by horses or by a water-mill. The machine consists of two cylinders, each about twenty-four inches in diameter, the surfaces of which are covered with teeth. The cylinders being made to rotate very rapidly, the roots are brought in contact with them, and speedily reduced to fine shreds or pulp. (The reader will recollect that, in Gottling's method, the roots were

sliced and hung upon strings to dry). The pulp falls into a vessel lined with lead. This method of rasping is found much more effectual than expression, for the latter method yields but forty or fifty per cent. of juice, whereas the former often yields as much as eighty.

As the pulp is ground, it is put into strong canvas bags, and placed under a powerful press to squeeze out the juice. The residue is stirred, and subjected to a second, or even third, pressure, till all the juice is extracted. The liquor, as it is pressed out, runs into a copper, until it is two-thirds full. A fire is now lighted, and the contents of the copper are raised to a temperature of about 180° Fahr. In the mean time, a mixture of lime and water has been prepared, by gradually pouring as much water upon ten pounds of quicklime as will give a cream-like consistency to the mixture. This is poured into the copper when its contents are at 180°, and is well mixed with the juice by stirring. The heat is then increased till the mixture boils, when a thick and glutinous scum rises to the surface. As soon as clear bubbles arise through this scum, the fire is suddenly extinguished by water being poured on it, or by a proper damper. The scum hardens as it cools; and the sediment being deposited, the liquor becomes clear, and of a light straw colour. The scum is then carefully removed with a perforated skimmer, and is put into a vessel till such time as the liquor remaining in it can be pressed out. A cock is now opened about five inches above the bottom of the boiler, and all the clear liquor is drawn off. Another cock, lower down, lets out the remainder until it begins to appear cloudy; that which still remains is afterwards boiled again with that extracted by pressure from the scum. The clear liquor is now subjected to evaporation in another boiler which is wide and shallow. The bottom is but slightly covered with the juice at first, and it boils rapidly. As the water evaporates, fresh juice is admitted. When a certain degree of inspissation, or thickening, has taken place, animal charcoal is gradually added; in such proportion, that one hundred weight of charcoal is required for the juice of two tons and a half of beet, which is now reduced to about four hundred gallons. The evaporation by boiling continues until a regular syrup is obtained. This is now strained through a linen bag, and the liquor is kept flowing by means of steam or hot air, and assisted by pressure. In two or three hours all the clear syrup will have run through.

The syrup then goes through a farther succession of processes to convert it into sugar. It is again boiled and skimmed, until it has attained a certain degree of concentration, which is known thus;—the skimmer is dipped into the syrup and drawn out; some of the thick syrup which adheres to it is taken between the thumb and finger, and held there till the heat is reduced to that of the skin; the finger and thumb are then separated, and if the syrup be of a proper strength, a thread will be drawn out, which has the transparency of barley-sugar. When the syrup has this proper degree of consistency, called "proof," the fire is put out, and the syrup is carried to the cooler, which is a vessel capable of containing all the syrup produced by four operations or boilings. Here the sugar is to crystallize. As soon as this process commences, the whole is well mixed and stirred; and, before it becomes too stiff, earthen moulds, of the well-known sugar-loaf shape, are filled with the crystallizing mass. When these moulds are full, they are carried to the coolest place on the premises. As the crystallization goes on, the crust formed on the top is repeatedly broken, and the whole is stirred till the crystals are collected in the centre; the crystallization is then allowed to go on without further disturbance. In three days the process is so far advanced, that the pegs which are put into the holes at the points of the moulds may be taken out, and the molasses or uncrystallizable syrup allowed to run out. White syrup is then poured on the top of the

moulds, which filters through the mass, and carries part of the colouring matter with it.

Sometimes this latter process is effected by what is termed *claying*. A stratum of fine moist pipe-clay is laid on the sugar in the mould; and clear water being poured on the clay, filters through it, and carries off the colouring manner remaining in the sugar. But if great care be not taken, one-fifth or sixth of the sugar becomes dissolved, and is carried off in the form of syrup. Chaptal at one time employed, instead of either of these two methods, another in which alcohol was poured on the sugar, in such manner as to carry off the colouring matter. But he abandoned the plan after two months' trial; finding that he lost a considerable quantity of alcohol, and that the sugar retained a little odour of the alcohol.

By whatever mode the sugar is bleached in the moulds the loaf is removed from the mould as soon as hardened, and placed in a stove, where it remains till dry.

The molasses, or uncrystallizable syrup, which remains from this process, is very nearly identical with that produced from cane-sugar, and from which *rum* is distilled. We shall not, therefore, detail the plan which Chaptal adopted for distilling spirit from the molasses, as that is an operation which does not belong to a sugar refinery.

The greater part of the operations described above are nearly the same as those by which sugar is prepared from the juice of the sugar-cane, except that much greater skill and nicety are required, on account of the smaller comparative quantity of sugar contained in the beet. But when the sugar is once prepared, it is impossible to distinguish it from cane-sugar. Five tons of clean roots produce about four and a half hundred-weight of coarse sugar, which give about a hundred and sixty pounds of double-refined sugar, and sixty pounds of inferior lump-sugar. The rest is molasses, from which spirit may be obtained. The dry residue of the roots, after expressing the juice, consists chiefly of fibre and mucilage, and amounts to about one-fourth of the weight of the clean roots used. It contains all the nutritive part of the root, with the exception of four and a half per cent. of sugar, which has been extracted from the juice, the rest being water.

The political and commercial considerations involved in the question, how far the cultivation of the beet-root will permanently benefit France is one into which we need not farther enter, as it has no particular relation to our own country.

ON CHESS. No. XV.

THE AUTOMATON CHESS-PLAYER. 3.

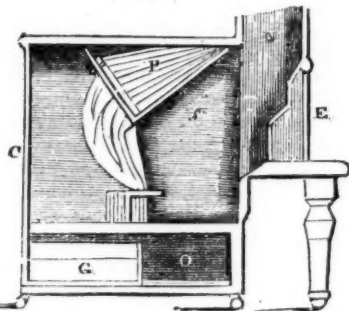
At the time when the automaton made its first appearance in England, chess was extensively patronised and played by the upper classes of society. The great Philidor spent a large portion of his time in London, formed a large chess-school around him, and excited public attention by those wonderful exhibitions for which he was so celebrated; viz., playing at the same time three different games against three good players, without seeing any one of the chess-boards. These circumstances contributed to make the chess-automaton a subject of the greatest curiosity, and although the sum of five shillings was charged for admission to see the automaton, yet hundreds and thousands of persons crowded to the exhibition.

Mr. Twiss, in his amusing work on Chess, informs us that he was present on some of these occasions, and conversed with M. de Kempelen, who once remarked:—

That the most surprising circumstance attending his automaton was, that it had been exhibited at Presburg, Vienna, Paris, and London, to thousands, many of whom were mathematicians and chess-players, and yet the secret by which he governed the motion of its arm, was never discovered. He prided himself solely on the construction of

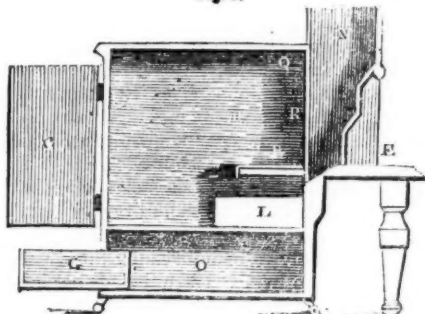
the mechanical powers by which the arm could perform ten or twelve moves: it then required to be wound up like a watch; after which it was capable of continuing the same number of motions. The automaton could not play unless M. de Kempelen or his substitute was near it, to direct its moves. A small square box during the game, was frequently consulted by the exhibitor; and herein, (says Mr. Twiss,) consisted the secret, which he told me he could in a moment communicate. He who could beat M. de Kempelen was of course certain of conquering the automaton.

Fig. 5.



A vertical section of the Chest, with the false back raised. Side view.

Fig. 6.



The same, with the false back closed. Side view.

This last assertion, however, is by no means true, as we shall see hereafter.

The *Monthly Review*, for April 1784, has the following remarks:—

Many are simple enough to affirm that the wooden man played *really*, and *by himself*, (like certain politicians at a deeper game) without any communication with his *constituent*. It appears, indeed, as yet unaccountable to the spectators, how the artist imparts his influence to the automaton at the time of his playing, and all the hypotheses which have been invented by ingenious and learned men to unfold this mystery are but vague and inadequate; but were they even otherwise, they rather increase than diminish the admiration that is due to the surprising talents and dexterity of M. de Kempelen.

A pamphlet was at the same time published in London, entitled, *The Automaton Chess-player Exposed and Detected*; in which the author says:—

I see a foreigner come among us, and demand five shillings a-piece admittance, to see what he calls an automaton chess-player. An automaton is a self-moving engine, with the principle of motion within itself; but this chess-player is no such thing. And therefore to call it an automaton, is an imposition, and merits a public detection; especially, as the high price of five shillings for each person's admission, induces the visitor to believe that its movements are *really* performed by mechanic powers: when, in fact, the whole delusion is supported by invisible confederates.

The opinion became very common that the automaton was moved by a concealed player, but where and how he was concealed after the apparently complete exposure of the interior of the machine, was as great a mystery as ever. One pamphleteer declares that he saw the ermine trimmings of the Turk's outer garment move once or

twice, when the figure should have been quite motionless; and he is convinced that there is a concealed confederate: "for," says he, "they only exhibit the automaton from 1 till 2 o'clock, because the invisible player could not bear a longer confinement; for if he could, it cannot be supposed that they would refuse to receive crowns for admittance from 12 o'clock to 4, instead of from only 1 to 2."

The automaton in the course of its travels visited, by special invitation, the court of Frederick the Great, at Berlin, where it conquered the monarch and his whole court. Eager to possess himself of the secret, Frederick for a large sum of money bought the automaton, and in a secret interview with M. de Kempelen learnt the whole art and mystery of this wonderful machine. Certain it is, that like a child who cries after a new toy and no longer regards it when possession has shorn it of its novelty, Frederick threw aside the automaton, and for many years it lay forgotten and neglected among the worn-out furniture of the Royal Court of Berlin.

M. de Kempelen died at Vienna in 1804. In 1806 when Napoleon occupied Berlin, we find the automaton chess-player under another master, and prepared again to astonish the world. Napoleon played a game with the automaton. After a few moves he purposely made a false move; the automaton inclined its head, replaced the piece, and made a sign to Napoleon to play correctly. He did so, and after a few moves, again played a piece incorrectly. On this occasion the automaton removed the piece from the board and played its own move. Napoleon was highly amused, and after a short time made a false move for the third time, when the automaton swept the pieces from the board and declined to continue the game.

We need not trace the progress of the automaton in a second tour that it made through various cities of Europe, until we again find it in London in 1819. We will merely stop for a moment at the Court of the king of Bavaria, to relate an anecdote of Prince Eugene Beauharnois, the king's son-in-law, told so amusingly by Mr. George Walker—

Eugene was fond of chess, and money was of little object. He could not resist the temptation of acquiring the secret which had set the wits of the world at defiance for so many years; and for the second time was the automaton chess-player sold like a slave for a price. Thirty thousand francs were asked by the proprietor,* and this sum was unhesitatingly paid by Prince Eugene for the machine and its key.

And now the moment has arrived when the treasured mystery of de Kempelen is to be again opened at the golden bidding of royalty. The veil is about to be raised and the curiosity of the king to be gratified. The courtiers are dismissed the room, the door locked by Eugene, and every precaution taken to ensure his acquiring the sole knowledge of the hidden enigma. The prince is alone with the demonstrator; the latter, unhesitatingly and in silence, flings open simultaneously all the doors of the chest; and Prince Eugene saw—what he saw!

Eugene, somewhat like his royal predecessor in the secret, found that when once revealed, the automaton was not worth keeping. He therefore acceded to the proposal of M. Maelzel to return him the machine on condition of paying interest for the purchase money. The automaton again proceeded on its travels—visited Paris, and was received with enthusiasm, and by the year 1819 it was again established in London in Saint James' Street.

Crowds of visitors flocked to the exhibition: the periodical literature of the day gave it almost unqualified praise, and the success was the more complete in consequence of the automaton vanquishing all its opponents with a few trifling exceptions. This encouraged the proprietor to offer odds to all comers, and forthwith the automaton gave the pawn and move to all its antagonists,

* M. Maelzel, the celebrated fabricator of the musical metronome and other works of art

and scarcely lost one game in a hundred. A volume was published in 1820 entitled, *A Selection of Fifty Games, from those played by the Automaton Chess-player during its exhibition in London in 1820. Taken down by permission of Mr. Maelzel at the time they were played.* In the preface to this work it is stated that:—

Since the commencement of its exhibition in February last, the automaton chess-player has played, (giving the pawn and move) nearly three hundred games, of which it has lost about six.

In our next article we will fully explain the mystery of the Automaton Chess-player.

PROBABLE ORIGIN OF THE DOCTRINE OF THE SUPREMACY OF THE POPE.

FOR many centuries, Rome has been a city of splendid ruins, with no empire except that vast supremacy which is rested upon the supposed grant of the Almighty.

At the time when the apostles Peter and Paul established the Church in Rome, it was the capital city of the civilized world. On such a capital, perhaps, the sun never shone. It is saying much less than the truth to assert, that what Paris is to France, or London to England, Rome was to the world; because France and England know that there are other powers upon the earth independent of their respective governments; but the subjects of that empire-city saw no power upon the earth independent of Rome. The ambassadors of every potentate came to do homage before the majesty of a single throne. Dissensions amongst nations were brought for settlement before the senate. Rival kings, contending for the same tributary diadem, submitted their claims to that august tribunal. The very name of Roman citizen was a protection and a privilege in every land, and an appeal to Rome was the final recourse of universal justice.

In our age, it is not easy—indeed it is hardly possible—to conceive aught of such a city. Divided as the nations have been ever since her decline and fall, and each government displaying but a fractional part of her whole dominion, it is hard for us to imagine the majesty, the force, the concentration, the harmony, the glory, the beauty, the overpowering splendour of the spectacle which ancient Rome, in the days of Augustus, displayed to the admiration of a subject world. To the moral sense, the picture was as sublime as it was beautiful. The whole earth in peaceful subordination to one man, and he content with the kind and moderate titles of general and father—the temple of Janus shut, and wars and commotions almost done away by the wise administration of supreme justice—the whole of the mighty empire bringing its treasures and its allegiance to the great centre, which was its fountain-head of power, and enjoying in return the rich advantages of protection and government, the valour and the labour of its legions, its science, and its literature, which, like the nerves and life-blood of the natural body, were diffused freely to the remotest extremities—all this displayed a picture of human unity, on which, in its theory, the philanthropist and the philosopher might well gaze with delight; nor can I imagine how, with such a picture before them, the minds of the best of men at that day could help being strongly affected.

About the time when the last touch of perfection had been given to this wonderful empire, Christianity arose, and a Church was established in the imperial city. In wealth, in numbers, in importance, it is obvious that it must soon have surpassed all other. Everything in the chief city of an ordinary kingdom acquires a kind of practical supremacy over the whole of that territory. The professions, the trades, the fashions, the literature, the amusements of the capital, give a sort of law to the rest, by a perfectly familiar principle of deference, which is acknowledged and understood by all men. What must

have been the strength of that principle in regard to imperial Rome?

But, perhaps, it may not be useless—inasmuch as the mind is often aided in its reflections on the force of circumstances by transferring them to some familiar object of our own day,—if I try to illustrate my idea of a secular supremacy by a simple analogy.

Let us suppose, then, that we had sent a number of missionaries to plant the Gospel in China, who had succeeded in establishing Churches in several of the provinces of that extensive country. In the progress of their labours, we are informed that a Church is gathered in the capital itself. The emperor, the powerful mandarins, the officers of government, the men of influence, are now likely to be brought under the blessed yoke of the Gospel. Is it not reasonable that we should attach tenfold more importance to that Church than to the provincial Churches—that for its support we should be most anxious—that into its progress we should most fondly inquire, and that we should expect, nay advise, all the other missionaries through the nation to be most solicitous for its welfare, and most ready to make its advancement the primary object of their prayers and toils?

If, however, such would be our views, at a distance from the field of action, how much more would the same principle of expediency operate on the missionaries themselves! Of what vast importance would they esteem the progress of truth in the capital of the Chinese empire! How surely would they calculate that success *there*, was, in fact, success every where! How thankfully would they count the numbers of converts from the ranks of the influential and the great, not because their souls were of more value, but because the conversion of such as these was the readiest mode of breaking down the kingdom of darkness, and inducing multitudes to examine, with favourable dispositions, the system of truth; and how manifest it is, that, in such a case, the missionaries settled in the provincial Churches would readily grant a primacy of influence and consequence to their brethren in the capital city, which would make them the chief leaders, advisers, and, in fine, directors of the whole! And yet, in all this, we see at a glance that it is simply to be resolved into the importance of the local situation that it has no connection whatever with the spiritual rank or ecclesiastical dignity of the missionaries themselves, but is purely the result of judicious views of practical expediency.

Now, then, if we were called to draw up a code of regulations for a body of missionaries thus circumstanced, should we not, perhaps, think it proper to advise all due regard to these principles? Should we not say, Be careful about union, and in all your proceedings consult together, but especially do nothing without consulting with your brethren of the capital city. In order that the good cause should prosper it is necessary that you should resort to the Church established there as often as you can: by reason of its more powerful principality, being the seat of the government, and the very heart of the empire, the Church located there is the most important of the whole, and the brethren placed over it should have the chief direction in all your councils. Would not such advice as this be deemed prudent and wise by all men? And hence, is it not plain that we could go very far in support of a primacy, without departing in the least from the ground of secular superiority derived simply from the importance of the location?

But in the situation of the Christian Church, as planted in ancient Rome, there was much more than any modern analogy can furnish, to contribute to the same result. During seasons of persecution, when heathen rage was excited against the faithful, *The Christians to the lions!* was the first cry, and the Church in Rome was usually called upon to take the lead in the glory of martyrdom. In times of peace the crowds of philosophers and disputers which thronged the imperial

city, drew out the best talents and strongest energies of the priesthood in the defence of truth. And the influx of strangers, the applications for aid, and the calls on liberality, which were sure to be most abundant where there was most inducement to attract them, would keep the sympathies, the hospitality, and the beneficence of that Church in the fullest action. Add to all this, that if the Christians in the provinces needed any indulgence from the government, their request could be best presented through the brethren at Rome; that the bishop of Rome was on the very spot where he had the best opportunity of appeasing the imperial wrath, or conciliating the imperial favour; that when the clergy or others had occasion to travel, his letters would have the greatest weight by reason of his local superiority; that when any of the prætors or provincial magistrates were likely to prove hostile to the Christian cause, the bishop of Rome was the only one who could hope to have influence sufficient with the officers of the court to have them counteracted or recalled; that writers on the Christian religion would first seek patronage and praise from the same dignitary, and that all who thought themselves aggrieved throughout the rest of the Church would naturally endeavour to strengthen their cause by the sentence of his approbation,—all this, and much more of the same character, suggests itself to a mind of common reflection, in tracing the various causes of the secular primacy obtained by that Church which was established near the throne of the Cæsars, in the empire-city of the world.

The last feature of the case presents the influence which these circumstances must have exerted on the minds of the Roman clergy themselves, when connected with the important fact that the secular empire of Rome was one mighty whole—the earth under one head,—the world under a single prince, and that prince called a father. Dull and stupid must the intellect have been that could fail to discover the application of this idea to the Christian Church,—for was it not in truth one kingdom under a single King?—one family under a Father? And why not give the benefit of this consolidation to the hierarchy on earth? Why not secure to the whole Church that order, and subordination, and peace under a single earthly head, as the Lord's viceregent, which heathenism had brought, in the affairs of human government, to such a marvellous system? Should the hosts of Satan be better marshalled than the hosts of God? Should one single will be felt and obeyed to the remotest bounds of that mighty empire, and should not one single Church, which is the spouse of Christ, be much rather the ruler and mistress through the whole of Christendom? On such a plan, how much more union might be expected; how much more peace; how much less opportunity for heresy and false doctrine; and how much more glorious would be the victory of the Lord's people, when they should appear to the heathen one mighty host, "bright as the sun, fair as the moon, and terrible as an army with banners."

I can easily conceive that the best men of the primitive ages, being accustomed to have this astonishing empire of the world continually before their eyes, and to hear it as the common and favourite theme of the orators, and courtiers, and civilians, and soldiers, and travellers round them, might readily in this manner, be led to contemplate the desirableness and practicability of a similar system in the Church, and to cherish and encourage every advantage they possessed for its perfect consummation, as providential instruments placed in their hands by Divine wisdom, for this especial purpose. I can easily conceive, that under this influence of their habitual views, they would find, in Scripture, analogies, and even declarations, which—had not the idea of universal empire been first rendered familiar by the political state of the world—would never have occurred to them. That thus disposed, they would derive a supposed

parallel in principle from the high priest of ancient Israel, and instead of applying it to the single district of a bishop, would apply it to the whole of Christendom—that they would lay hold on our Lord's addresses to Peter (the only passages in the New Testament which ingenuity itself could put into the semblance of Divine authority,) and begin to interpret them in favour of their ecclesiastical empire,—that all who were connected with Rome, who had obligations to the Church there, who feared their censure or loved their praise, or who had anything to expect from their influence, would readily adopt the system; and that the converts amongst the great and noble, who had been accustomed to the maxim, that Rome was the mistress of the world, would be prompt and zealous in defence of an idea which harmonized so well with their own political and patriotic feelings—all this I can conceive most readily, as easily accounting for the rise and progress of a secular primacy, without calling it by any harsh or offensive name. I do not, therefore, look upon your doctrine as having its *origin* in tyranny, in fraud, or in a desire to lord it over mankind. Its beginning, I think, I have traced to a much better set of principles. And as I hold myself bound in all cases to look for the most favourable motives and causes of human action, so I attribute to the policy of the primitive Church of Rome nothing more than can be fully explained by the favourable influence of their location, their habits of dwelling on the theory and practice of universal empire, and their desire to secure the unity and peace of the Church; on the supposition that they were holy and well-meaning men.

Of the difference between the local primacy and that now asserted, I shall only for the present observe that the one was secular, the other is spiritual; the one was human, the other is divine; the one interfered with the liberty of no other Church, the other claims authority over the whole. The one grew out of the political pre-eminence of ancient Rome, and should now be yielded, of right, in their respective proportions, to the other cities, which, in the order of Providence, have attained a far larger measure of influence over the affairs of men; but the other insists on the fiat of the Almighty, superior to all earthly mutation, that Rome shall be the mother and the mistress of the Christian world to the end of time.—BISHOP HOPKINS.

ON DREDGING.

AMONG the great effects produced by apparently small causes may be ranked the accumulation of sand and mud in rivers, harbours, canals, and basins, by the settlement of the solid matters brought down by rivers from the land. The sand-banks near the mouths of the Scheldt, the Meuse, the Rhine, the Elbe, the Thames, the Humber, and other considerable rivers, furnish important evidence of the extent to which this subsidence often proceeds, and of the serious consequences which result therefrom to shipping. Geologists have enumerated many remarkable instances of the effects thus produced, in which a place, once regarded as a sea-port, is now to all intents and purposes an inland town, such as Sandwich in Kent, by the subsidence of sand and mud on the banks. It forms no part of our present object to enter into a geological inquiry on this matter, but to detail the means whereby a river, when too much choked with sand and mud, is cleansed.

The Dutch, whose country presents an extraordinary example of the effects of these fluviatile deposits, long ago devised an apparatus called the *spoon-dredging machine*, for removing some of the sediment from the beds of their rivers and harbours. From the Dutch its use passed to the English, and we may now frequently see such an instrument employed on the River Thames, although not so often as before the introduction of steam-dredging machines.

The cut at the end of this article will show pretty clearly the action of the spoon-dredging machine. In the first place, there is a boat, varying in size according to the situation in which it is to be worked, but generally from twenty to sixty tons burden. It is built so as to float with an easy draught of water, and is usually built as an open boat, with a kind of inner floor; but in some cases it is flush-decked, carrying its cargo wholly upon deck. Sometimes the matters excavated from the bottom of the river are employed in banking on the sides of a river, or in ballasting ships, but in other instances emptied out into some deeper part of the same river; and when the latter is the case, the boat is provided with a kind of trap-door at bottom, to let out the mud. In this case a hold of two compartments, one fore and one aft, is formed, represented in the cut by the lines passing obliquely downward, and shaped like a hopper, narrower at the bottom than at the top. Each of these apertures has an opening in the bottom, through which the mud is dropped when the flap-door A is opened.

The spoon or shovel B consists of a strong ring or hoop of malleable iron, the cutting part of which is of steel; it is about six or seven feet in circumference, and properly formed for dredging upon soft mud or gravelly ground. To this ring is strongly attached, by means of thongs, a large bag, made sometimes of bullock's hide, but more generally of tanned leather; and perforated with a number of small holes, for allowing water to drain off. This bag, the capacity of which is about four or five cubic feet, being fixed to the ring, the spoon-bowl thus formed is attached to a pole thirty or forty feet long, or else to a pair of sliding poles, so connected as to admit of being lengthened or shortened according to the depth of the water in which the apparatus is to work. A rope is attached to the bottom of the bag, for directing its position at the commencement of each operation. The apparatus is generally worked with a chain or rope, brought from the spoon to a winch worked with wheel and pinion, through a block suspended from a small crane used for hauling the bag and its contents along with the progress of the boat, and in lifting the spoon over the gunwale to be emptied into the hopper of the boat. The purchase rope is led along the deck to the winch, by a block placed in a proper direction for this purpose. These boats are generally managed by two, three, or four men, who with this simple apparatus can lift from twenty to sixty tons of sediment from the bottom, at a depth of two and a half or three fathoms, when the ground is somewhat loose and favourable for the operation. Their mode of proceeding is as follows:—The barge being moored over the place where it is proposed to dredge, and one end of the working-rope being fastened to the chain of the spoon, and the other end to the barrel of the crane, the man who is stationed at the handle or pole of the spoon, immediately allows the spoon to fall into the water. At the same moment the man at the crane-work throws it out of gear, when a third man seizes the small rope which is fastened to the bottom of the bag, and runs with it along the gunwale, and prevents the spoon from sinking until it gets to the other end of the barge. When this is effected, the man at the pole turns it up, inclining the pole head towards the crane-end of the barge, and takes a turn with a small rope round the pole and rail of the vessel, which keeps the spoon dredging along in its proper position. The man at the crane draws along the spoon until it be nearly under the crane, when the man at the pole inclines it backward, and the contents (now deposited in the bag) are hoisted up and emptied into the barge.

In Holland, this apparatus, and other simple modes of dredging, are much practised upon the extensive flats at the entrance of their great navigable rivers, in connexion with the sluices and natural currents.

issuing from their extensive basins and canals, and the excavated matter is generally of a mossy description, which, after being strongly compressed in moulds by that industrious people, is in a state to be speedily used as turf-fuel.

On the Thames (says a recent writer) the spoon-dredging machine is conducted upon a large scale, and in the most systematic manner, under the immediate direction of the Trinity Board. The stuff brought from the bottom consists chiefly of mud and gravel. This is not only a useful operation for deepening and preserving the navigation, but the stuff itself is sold to good advantage, as ballast for shipping. To such an extent is this carried that the colliers, or shipping from London to Newcastle, have raised ballast-hills in the neighbourhood of Shields, which, from their vast extent, have become objects of no small curiosity.

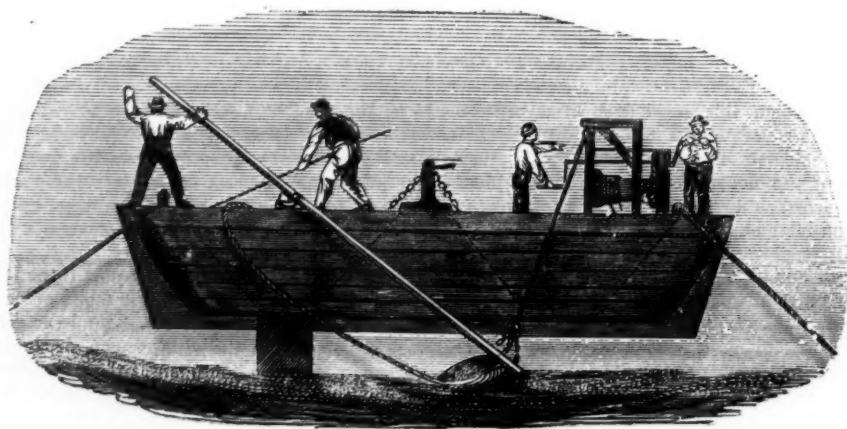
Another kind of dredging-machine, formerly much employed in the river Clyde, and other parts of Britain, consists of a large plate of iron, about four feet long and eighteen inches deep, and sharpened on the under edge. To each end of this plate of iron a plank of hard wood is fixed to tenons cut in the iron, the sharpened edge of iron projecting about four inches below the wooden sides. The whole forms something like a box, without top or bottom, eighteen inches deep at the one end and ten inches at the other. From the two extreme points of the wood a chain is fixed, for attaching the principal working rope or chain. In order to put the machine in motion, it is requisite to have a punt moored on each bank of the river directly opposite, and on each of these punts a capstan, or windlass, the one for drawing across the empty dredge, and the other for bringing it back. In the course of its passage the dredge is generally filled, and by means of the capstan it is drawn so high up that men at low water can remove the stuff with shovels. Where the shiftings are not frequent a capstan or windlass may be placed on the bank of a river, and the operation performed as before. But as this method is very tedious where dredging of great extent is required, it is now little used except in levelling foundations under water, for which it is well adapted, if the material is soft sand or mud.

But by far the most complete and effective dredging-machines are those which consist of an endless chain of buckets, ascending full and descending empty, each bucket collecting its cargo of stuff when at the bottom of the river. Such machines, when first introduced, were worked by men, but when the principles on which such machines act were more fully ascertained, horses were employed, who worked round a covered gin-trap,

or circular path within the boat. Still more recently, when the importance of substituting steam-power for that of horses and men has been so clearly seen, steam-dredging machines have been constructed, and are now used in various parts of Britain.

One of the most complete dredging-machines ever constructed was made for the harbour of Aberdeen a few years ago. The vessel and the steam-engine, as well as the dredging apparatus, were all made expressly for the purpose, and for each other. The vessel is ninety feet long, and twenty-two broad, with a longitudinal opening along the middle of the ship, extending more than half its length, being fifty-four feet long, and intended for the reception of the frame containing the buckets. The vessel draws only four feet of water, but the bucket-frame can be lowered so as to dredge at a depth of fifteen feet. One half of the length of the vessel, as just observed, has a longitudinal slit or opening through which the buckets descend into the water, and the other half contains the steam-engine by which the buckets are worked. The bucket-frame is a kind of ladder, placed in a diagonal direction, through the middle line of the ship, part being above, and part dipping into the water. The frame is fifty-two feet in length, each side being of one entire piece of oak timber. The two ends of this frame serve as supports for a chain to which the buckets are attached. The links of the chain weigh, some forty-four, and others eighty-four pounds each. The buckets are twenty-one inches deep, twenty-six inches wide in one direction, and from fourteen to nineteen in the other. The operation, then, is this. The steam-engine sets some machinery in motion, which moves the chain to which the buckets are attached, and the buckets are thus drawn alternately up and down, having their mouths open top uppermost when ascending, and lowermost when descending. The length of the chain is so regulated that the buckets may just dip or scrape into the mud at the bottom of the harbour, and the mud, when hauled up, is emptied into barges placed alongside the vessel. The expense of this apparatus in its complete state was nearly five thousand pounds.

In most bucket-dredging machines there are two series of buckets, one on each side of the vessel, but the mode of operation is nearly the same in both cases, the chain of buckets in each being arranged in an inclined position from head to stern of the vessel, and the buckets alternately ascending and descending, full in the former position and empty in the latter.



THE SPOON DREDGING MACHINE.